AMENDMENT UNDER 37 C.F.R. § 1.111
US SERIAL NO. 09/787,358

The claims are amended as follows:

1. (As amended) A mass spectrometer comprising:

means (1) for generating ions from a sample introduced into a plasma;

a sampling aperture (2) for transmitting some of the ions into an evacuated expansion chamber (3) along a first axis (9) to form an ion beam;

a second aperture (5) for transmitting some of the ion beam into a first evacuated chamber (6);

a first pump (7) for maintaining the first evacuated chamber (6) at high vacuum;

a first ion optical device (17) located in the first evacuated chamber (6) for containing the ion beam wherein the first ion optical device (17) is a mass selective device;

a third aperture (19) for transmitting the ion beam into a second evacuated chamber (20);

a second pump (21) for maintaining the second evacuated chamber (20) at a lower pressure than the first evacuated chamber (6);

a collision cell (24) having an entrance aperture (27) and an exit aperture (28) and pressurized with a target gas (26), the collision cell (24) being disposed in the second evacuated chamber (20);

a second ion optical device (25) located in the collision cell (24) for containing the ion beam;

a fourth aperture (32) for transmitting the ion beam into a third evacuated chamber (33) containing mass-to-charge ratio analyzing means (37) disposed along a second axis (36) for mass analyzing the ion beam to produce a mass spectrum of the ion beam such that both the first ion optical device (17) and the mass-to-charge ratio analyzing means (37) operate at the same mass to charge ratio;

a third pump (39) for maintaining the third evacuated chamber (33) at lower pressure than the second evacuated chamber (20).

3. (As amended) A mass spectrometer according to claim 1, wherein the first evacuated chamber (6) is maintained at a pressure of approximately 1-2 x 10^{-3} mbar.

4. (As amended) A mass spectrometer according to claim 1, including a gap of at least 2 cm between the third aperture (19) and the entrance aperture (27) of the collision cell (24).

5. As amended) A mass spectrometer according to claim 1, wherein the distance between the ion source (1) and the entrance aperture (27) of the collision cell (24) is 90 to 200 mm.

6. (As amended) A mass spectrometer according to claim 1, wherein the mass-to-charge ratio analyzing means (37) includes a main mass filter which preferably is an RF quadrupole.

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8. (As amended) A mass spectrometer according to claim 1, wherein the first ion optical device (17) is an RF quadrupole.

9. (As amended) A mass spectrometer according to claim 1, wherein the second ion optical device (25) is an RF quadrupole.

10. (As amended) A mass spectrometer according to claim 1, wherein the second ion optical device (25) is mass selective.

11. (As amended) A mass spectrometer according to claim 1, wherein the second axis (36) of the mass to charge ratio analyzing means (37) is offset from the first axis (9).

12. (As amended) A mass spectrometer according to claim 1, wherein the first evacuated chamber (6) is divided into a first region (14) adjacent to the expansion chamber containing an extractor lens (8) driven at a negative potential, and a second region (15) adjacent to the collision cell (24) in which the ion optical device (17) is located, by a large diameter aperture (11) and the aperture is sealable by means of a flat plate (12) on an O-ring seal (13).

Please add the following new claims 13 - 26:

13. A method of operating an ICP mass spectrometer that incorporates a collision cell pressurized with a target gas, comprising the steps of:

generating, from an ion source, an ion beam including analyte ions and artefact ions;
mass selecting the ion beam at an analyte mass to charge ratio;
transmitting the ion beam into the collision cell;
inducing collisions between the artefact ions and the target gas in the collision cell; and
mass analyzing the beam at the analyte mass to charge ratio.

14. A method according to claim 13, wherein the mass selecting is achieved by passing the ion beam through a first mass selective ion optical device.

15. A method according to claim 14, further comprising locating the first mass selective ion optical device in a first evacuated chamber maintained at high vacuum.

16. A method according to claim 15, further comprising locating the collision cell in a second evacuated chamber operated at lower pressure than the first evacuated chamber, the ion beam being contained in the second evacuated chamber by a second ion optical device.

17. A method according to claim 15, wherein the first evacuated chamber is maintained at a pressure of approximately 10^{-2} to 10^{-4} mbar.

18. A method according to claim 15, wherein the first evacuated chamber is maintained at a pressure of approximately 1-2 x 10^{-3} mbar.

19. A method according to claim 16, wherein the ion beam, resulting from transmitting some of the ions from the ion source through a sampling aperture into an evacuated expansion chamber along a first axis, is transmitted into the first evacuated chamber through a second aperture, and into the second evacuated chamber through a third aperture, and wherein a gap of at least 2 cm is maintained between the third aperture and an entrance aperture of the collision cell.

20. A method according to claim 13, wherein a distance of 90 to 200 cm is maintained between the ion source and an entrance aperture of the collision cell.

21. A method according to claim 19, further comprising locating a mass-to-charge ratio analyzing means in a third evacuated chamber operated at lower pressure than the second evacuated chamber and disposing the mass-to-charge ratio analyzing means along a second axis, wherein the mass-to-charge ratio analyzing means includes a main mass filter which preferably is an RF quadrupole.

22. A method according to claim 14, wherein the first mass selective ion optical device is an RF quadrupole.

23. A method according to claim 16, wherein the second ion optical device is an RF quadrupole.

24. A method according to claim 16, wherein the second ion optical device is mass selective.

25. A method according to claim 15, wherein the first evacuated chamber is divided into a first region adjacent to the expansion chamber containing an extractor lens driven at a negative potential, and a second region adjacent to the collision cell, by a large diameter aperture and the aperture is sealable by means of a flat plate on an O-ring seal.

26. A method according to claim 21, wherein the second axis is offset from the first axis.